

REMARKS

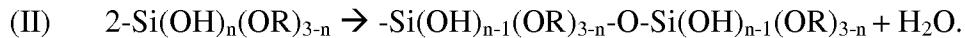
Claims 1-10 remain pending in the application with Claims 1 and 9 in independent form. Claims 1 and 9 are currently amended to correct a typographical error with respect to the term “organosilanes,” which existed in these claims as originally filed. Thus, no new matter is added in the present Amendment. No claims are cancelled or withdrawn in the present Response.

Claims 1-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over United States Patent No. 3,476,826 to Millen (hereinafter “Millen”). In particular, the Examiner contends that Example 1 of Millen discloses a method of preparing vinyl triethoxy silane polysulfide by mixing vinyl triethoxy silane and a polysulfide polymer. However, the Examiner admits that Example 1 of Millen does not disclose a mixture including a nitrogen containing base or sulfur, as claimed in the subject application. Therefore, to address this deficiency, the Examiner contends that Example 2 of Millen discloses a method of preparing a high sulfur rank polysulfide polymer by mixing paraformaldehyde, a polysulfide polymer, triethylamine, n-dibutylamine, and sulfur. However, Example 2 does not disclose a mixture including a silicon-containing compound having a silicon atom-bonded monovalent organic group with an aliphatic unsaturated bond, as claimed in the subject application. Thus, the Examiner contends that it would have been obvious to combine the mixtures in Examples 1 and 2 to arrive at the present invention. For the reason set forth below, as well as the reasons set forth in Paragraphs 7-17 of the attached Declaration, the Applicants respectfully disagree.

In particular, Millen does not teach or disclose a method for the preparation of a silicon-containing polysulfide-type polymer by mixing (A) a silicon-containing compound having a silicon atom-bonded monovalent organic group with an aliphatic unsaturated bond; (B) a polysulfide polymer with at least two mercapto groups in one molecule; and (C) an organic base or ammonia in the presence of (D) sulfur, as claimed in the subject application. In fact, combining the components of Examples 1 and 2 of Millen would result in a chemical reaction fundamentally different than the reactions utilized in the method claimed in the subject invention. Because the chemical reaction utilized in the claimed method is fundamentally different than the reactions of the Millen, the end product formed from each respective reaction is different as well. The Applicants respectfully submit that because the end product formed from the method claimed in the subject application is different than the end product formed in Millen, the results of Applicants' claimed method are both unexpected and unpredictable in view of the teachings of Millen.

As set forth in Paragraph 12 of the attached Declaration, in Example 2 of Millen, a blocked polysulfide polymer is reacted with paraformaldehyde in the presence of triethylamine to form a blocked polysulfide polymer. The polysulfide polymer is then reacted with elemental sulfur and catalyzed by n-dibutylamine and water. If Example 2 were to be combined with Example 1, as suggested by the Examiner, the vinyl triethoxy silane and the vinyl triethoxy silane polysulfide of Example 1 would react with the water from Example 2, as readily appreciated by one of skill in the art. In particular, the vinyl triethoxy silane and

the vinyl triethoxy silane polysulfide would react with the water according to the following reaction mechanisms:



In each of the reaction mechanisms (I) and (II) set forth immediately above, the dash (-) in front of the silicon atom illustrates that the silicon atom may be bonded to a carbon atom of a vinyl group, as in the instance in which it is the vinyl triethoxy silane which is reacting with water, or the silicon atom may be bonded to an atom in a polysulfide polymer, as in the instance in which it is the vinyl triethoxy silane polysulfide which is reacting with water. As known throughout the art, reaction mechanism (I) is commonly referred to as a hydrolysis reaction, and reaction mechanism (II) is commonly referred to as a condensation reaction. Notably, water is not included in the chemical reaction of the claimed method. As such, there is neither a water-initiated hydrolysis reaction, as represented by reaction mechanism (I) above, nor a condensation reaction of hydrolysates formed from a water-initiated hydrolysis reaction. Therefore, there are at least two reactions that would take place if Examples 1 and 2 of Millen were combined as suggested by the Examiner, which do not take place in the claimed method.

In addition, the Examiner contends that Example 2 of Millen discloses a method of forming a high sulfur rank polysulfide polymer by mixing paraformaldehyde with a polysulfide polymer, triethylamine, n-dibutylamine, and sulfur. *However*, as set forth in the attached Declaration, the triethylamine and the elemental sulfur are utilized in subsequent steps and for

different purposes. In particular, the triethylamine is used in combination with paraformaldehyde in a first reaction to block the –SH groups of a liquid polysulfide polymer to form a blocked polysulfide polymer. *Then*, the blocked polysulfide polymer is reacted with n-dibutyl-amine, water, and elemental sulfur to form the high sulfur rank liquid polysulfide polymer. Notably, this is not a reaction between a silicon-containing compound having a silicon atom-bonded monovalent organic group with an aliphatic unsaturated bond and a polysulfide polymer with at least two mercapto groups in one molecule. Rather, this is two subsequent reactions; one of which between paraformaldehyde and the polysulfide polymer along with the triethylamine, and the second between the blocked polysulfide polymer, n-dibutyl-amine, water, and elemental sulfur. As such, the organic base and the elemental sulfur are utilized in a *different* type of reaction between *different* components than in the invention.

Further, as set forth in Paragraph 14 of the attached Declaration, Example 1 of the '826 patent reacts a polysulfide polymer having two mercapto groups per molecule and vinyl triethoxy silane. This reaction is catalyzed by 2,2'-azobisisobutyronitrile, which is known in the art as a radical initiator, and is neither an organic base nor ammonia. There is no teaching or disclosure whatsoever in Millen regarding utilization of an organic base or ammonia *or* elemental sulfur to catalyze a reaction between a polysulfide polymer having two mercapto groups per molecule and vinyl triethoxy silane, let alone the utilization of an organic base or ammonia *and* elemental sulfur to catalyze such a reaction, as claimed in the subject application. Further, there is no teaching or disclosure whatsoever in Millen that a silicon-containing compound having a silicon atom-bonded monovalent organic group, an aliphatic

unsaturated bond and a polysulfide polymer with at least two mercapto groups in one molecule, and an organic base or ammonia may be reacted in the presence of sulfur to form a silicon-containing polysulfide-type polymer without the requirement of 2,2'-azobisisobutyronitrile, which was known as a radical initiator.

The advantages and unexpected results of utilizing the organic base or ammonia in combination with sulfur to catalyze the reaction between a polysulfide polymer having two mercapto groups per molecule and a silicon-containing compound having a silicon atom-bonded monovalent organic group with an aliphatic unsaturated bond are exemplified in Comparative Examples 1 and 2 of the subject application, as described immediately below and in Paragraph 15 of the attached Declaration.

In particular, in Comparative Example 1, a silicon-containing compound having a silicon atom-bonded monovalent organic group with an aliphatic unsaturated bond and a polysulfide polymer with at least two mercapto groups in one molecule were mixed with an organic base. Notably, the reaction between the silicon-containing compound having a silicon atom-bonded monovalent organic group with an aliphatic unsaturated bond and the polysulfide polymer with at least two mercapto groups in one molecule did not occur. Similarly, in Comparative Example 2, the silicon-containing compound having a silicon atom-bonded monovalent organic group with an aliphatic unsaturated bond and the polysulfide polymer with at least two mercapto groups in one molecule were mixed with elemental sulfur. Once again, the reaction between the silicon-containing compound having a silicon atom-bonded monovalent organic group with an aliphatic unsaturated bond and the polysulfide polymer with

at least two mercapto groups in one molecule did not occur. These Comparative Examples illustrate the benefits of mixing a silicon-containing compound having a silicon atom-bonded monovalent organic group with an aliphatic unsaturated bond, a polysulfide polymer with at least two mercapto groups in one molecule, and an organic base or ammonia in the presence of sulfur. Notably, in Example 2 of Millen, the organic base and the sulfur were used in subsequent steps for different purposes, and there is no teaching or disclosure whatsoever to use these components in a single reaction. Further, there is no teaching or disclosure whatsoever in Millen to use either the organic base or the sulfur, let alone both of these components, when reacting a silicon-containing compound having a silicon atom-bonded monovalent organic group with an aliphatic unsaturated bond and a polysulfide polymer with at least two mercapto groups in one molecule, as claimed in the subject application.

To arrive at the claimed method from the disclosure of Millen, one of skill in the art would have had to select vinyl triethoxy silane and a polysulfide polymer from Example 1 of Millen, while excluding 2,2'-azobisisobutyronitrile, which was known in the art as a radical initiator, and select elemental sulfur and triethylamine from Example 2 of Millen without first reacting the polysulfide polymer with paraformaldehyde and the triethylamine and while excluding water, and combine these components. For the reasons set forth above, as well as the reasons detailed in Paragraphs 7-17 of the attached Declaration, the Applicants respectfully submit that there is no reason whatsoever that one of skill in the art would have selected these particular components, while excluding other particular components, to arrive at the claimed method of the subject application.

As the Examiner is aware, combining known prior art elements is not sufficient to render the claimed invention obvious if the results would not have been predictable to one of ordinary skill in the art. *United States v. Adams*, 383 U.S. 39, 51-52, 148 USPQ 479, 483-84 (1966). Further, the mere fact that references can be combined or modified does not render the resultant combination [or modification] obvious unless the results would have been predictable to one of ordinary skill in the art. *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1734, 82 USPQ2d 1385, 1396 (2007). For the reasons set forth above, as well as the reasons described in Paragraphs 7-17 of the attached Declaration, the Applicants respectfully submit that the subject invention would not have been predictable to one of skill in the art upon a full reading of Millen.

In view of the foregoing, the Applicants submit that independent claims 1 and 9, as well as claims 2-8 and 10 that depend therefrom, are both novel and non-obvious over the prior art including over Millen. As such, the Applicants believe the subject application is in condition for allowance, and such allowance is respectfully requested.

This Response is timely filed; thus, it is believed that no additional fees are due. However, if necessary, the Commissioner is authorized to charge Deposit Account 08-2789 in the name of Howard & Howard Attorneys PLLC for any additional fees or to credit the account for any overpayment.

Respectfully submitted,

HOWARD & HOWARD ATTORNEYS PLLC

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Date

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